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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

DENDROLOGY
FOREST EXPERIMENT STATIONS
GRAZING RESEARCH
FOREST PRODUCTS
FOREST ECONOMICS

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COMBINED MONTHLY REPORT

BRANCH OF RESEARCH

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COMBINED MONTHLY REPORT

BRANCH OF RESEARCH

FOREWORD

Literature Searches

E. J. Crane
Editor, Chemical Abstracts

Finding and Preserving Information

Much space has been given to the description of abstract journals, etc., but the searcher must know how to get into them: the index is the door, so to speak, by which we enter these storehouses of information. It is easy to say to one: "Look in the index," but it is quite another matter to teach one how to use an index effectually. Few realize how difficult it is to be sure that all possible information on a given subject has been found and yet the completeness of a search is frequently of the utmost importance. Finding out a great deal about any topic is easy: finding everything that has been published about it is quite another matter. A hole in a literature survey may be as disastrous as a puncture in a tire.

The main problem, of course, in using the journal literature is in finding references, all that are pertinent to the subject at hand, in order that one may learn what the literature contains and all that it contains relating to this subject. This is often difficult. It is doubtful if there is a more important problem for students, in college or out, to learn how to solve. Its solution involves to some extent a familiarity with the more important journals, particularly the abstract journals, but above all it involves a knowledge of indexes and how to use them. References to the journal literature are often obtained from books or from one paper to others, but mostly they are obtained from indexes, usually of abstract journals. It is frequently assumed that the use of indexes in making literature searches is a simple matter requiring no special experience or ability. This is a mistake. The making of indexes is an art in itself, involving more than a comprehensive knowledge of the general subject being covered, and the use of indexes is no less an art. This deserves emphasis. It is true partly because existing indexes vary greatly in kind, thoroughness, and quality. Even in the use of the best subject indexes the user must meet the indexer part way for really good results. Conscious effort to become a good index user will repay any scientist. Many a day has been spent in the laboratory seeking information by experiment which might have been obtained in a few minutes, or hours at the most, in the library, had the literature search been efficient. Because of the belief that index searching is a neglected art and yet one of much importance, the remainder of my limited time will be devoted to subject indexes - the most useful kind.

(Over)

What constitutes a good index? The test is to determine whether or not an index will serve as a reliable means for the location, with a minimum of effort, of every bit of information in the source covered which, according to the indexing basis, that source contains. To meet this test an index must be accurate, complete, sufficiently precise in the information supplied, and so planned and arranged as to be convenient to use. Existing indexes fall far short of this ideal in many cases, and of course somewhat short of it in all cases.

The main purpose in indexing is sometimes partially lost sight of through an effort to bring some sort of classification into it. Classification in connection with indexing frequently detracts from, rather than enhances, the efficiency and usefulness of an index, and is beside the main purpose.

How to Use an Index

The first step in learning how to use subject indexes with maximum effectiveness is to become familiar with the characteristics and peculiarities of important existing chemical indexes. The most significant point to note is whether or not a so-called subject index is really an index of subjects or an index of words. The tendency to index words instead of thoroughly to enter subjects constitutes the greatest weakness in the literature of chemistry. There is a vast difference. Words are of course necessary in the make-up of a subject index, but it is important for an indexer to remember that the words used in the text of a publication are not necessarily the words suitable for index headings or even modifying phrases. Word indexing leads to omissions, scattering, and unnecessary entries. After the most suitable word or group of words from the indexing point of view has been chosen for a heading, it should of course be used consistently no matter what the wording of the text may be. To illustrate a kind of scattering of entries which may result from word indexing, let us consider such a series of article titles as follows:

"An Apparatus for the Determination of Carbon Dioxide," "A New Absorption Apparatus," "Apparatus for Use in the Analysis of Baking Powder," "An Improved Potash Bulb and Flue Gas Analysis." Word indexes would no doubt contain an entry under the heading "Carbon dioxide" for the first title, one under "Absorption apparatus" for the second, under "Baking powder" for the third, under "Potash bulb" for the fourth, and one under "Flue gas" for the fifth, and probably no others. These entries seem reasonable enough if the titles are considered separately without thought of the others. And yet the articles may all be descriptive of the same sort of apparatus. As a matter of fact, all these titles might conceivably be used for the same article; if the author happened to be working on baking powder or on flue gas analysis when he conceived the idea for his novel piece of apparatus, or had it in mind particularly for one purpose or the other, he might choose one of the more specific titles for his article rather than one of the more general ones.

In an index entirely based on subjects rather than words, it would be the task of the indexer to see that all these articles get indexed under one heading, or under each of more than one heading, best with cross references pointing from the other possible headings to the one or more headings used.

Or, if there seems to be some justification for scattering owing to differences in point of view (word indexing cannot be gotten away from entirely), he would make sure that the necessary cross references are supplied to lead the index user about from heading to heading so that all entries can be readily located. It is not hard to determine whether or not an index is a word index; when this is suspected or noted, one should look around pretty thoroughly in its use instead of being satisfied that the entries found under the obvious heading are all that the index contains on a subject.

It is important to note the approximate degree of completeness of an index in use. There is perhaps no definite point at which a subject index may be said to be complete. The indexing basis is too indefinite. A great many subject indexes are not as full as they ought to be. Aside from word indexing the indexing merely of titles is the most common reason for incompleteness. Titles cannot be depended upon to furnish the information necessary for adequate subject indexing. An index may be reasonably complete from one point of view and not from others. For example, a publication devoted to bacteriology may not reasonably be expected to be indexed fully from the chemical viewpoint. Completeness in the information supplied in modifying phrases, as well as completeness in index headings, needs to be taken into consideration. It is necessary, of course, to call forth one's resourcefulness to a special degree if a relatively incomplete index is to be used.

Cross references play an important role in subject indexing and in the use of subject indexes. Word indexing is really hard to avoid and cross references are the great preventive. It is a good sign if a subject index has a plentiful supply of cross references, both of the "see" kind and the "see also" kind. They make for uniformity and proper correlation. "See also" cross references are of just as much importance as the "see" kind though not as much used. The service which they render in directing the index user to related headings or to headings which, though dissimilar for the most part, have entries under them likely to be of interest to the investigator who refers to the original heading, is often the chief means of making a search complete. It is not reasonable to expect an index user, or an indexer, as a matter of fact, to think of all the headings representing related or significant subjects under which headings he may find valuable references that might otherwise be missed. Nevertheless, in the careful indexing year after year of a periodical devoted to a more or less definite field, as an abstract journal for example, subjects are come upon in such a variety of connections and from so many angles that it is possible for a truly comprehensive list of cross references to be built up. The suitability of a given "see also" cross reference may not be clear, much less suggest itself, until a specific case in which it is helpful is observed. It often pays to follow up such a cross reference even when it does not look as if it applies in a given case. The indexer, in surveying the whole field year after year, is in a position to make valuable suggestions in the form of cross references calculated to lead the index user from place to place in the index, so that the chances that his search will be really exhaustive as far as that particular index is concerned are much increased.

Persistence is a good qualification for index searching. It is desirable to avoid being too soon satisfied. There is no task in which thoroughness is more important. It involves first a knowledge of the indexing system and of the characteristics of the index. Then one needs to be resourceful, exhausting all possibilities, if he is to avoid some futile searches or incomplete findings. One's fund of general knowledge can usually be brought into service to good advantage.

On account of the necessity of drawing on one's general knowledge in making a literature search in any field, it is in many instances important that one should make his own searches. It is not always safe to let some one less well informed in a certain field make an index search when a complete survey is desired, even though his familiarity with indexes and the literature in general may be better than one's own. Just as some tasks in the laboratory can be turned over to another to advantage but not the more important determinations and experiments, so some tasks in the library can be delegated to an assistant, but not all such tasks. Knowledge, skill, and power of observation, are factors fruitful of important results in the library as well as in the laboratory. Literature searching is a dignified pursuit, and it cannot with impunity be assigned to a lower level than that of the laboratory side of problems, as far as the attention it receives is concerned.

With a given problem at hand the first step, of course, is to think out the most likely places to look in the indexes to be used. This may be a simple matter or it may be a very difficult one, depending on the nature of the problem. Difficulty increases with indefiniteness. Experience is necessary. In fact, the beginner is often completely at a loss to know what to do at this very stage of his search. This point is stressed in the Report of the Subcommittee on Research in Chemical Laboratories, presented to the Committee of One Hundred on Scientific Research, New York, December 26, 1916. In this report, which commends and recommends courses in chemical literature searching in universities, it is pointed out that the average graduate "fails to analyze the subject" in which he is interested "into its factors, and hence generally looks for topics which are too general. Because he does not find any references to the problem as a whole as he has it in mind, he assumes that nothing has been done upon it and that there is nothing in the literature which will be of aid to him in the investigation. Were he to separate his subject into its essential parts and then to consult the literature on each factor, he would find considerable information which he otherwise would miss." Even though some index headings to which to turn, perhaps the more important ones, may be brought to mind without ingenuity, the completeness of a search may be marred by a failure properly to analyze the problem. Indexes with cross references, particularly "see also" ones, help.

Too much dependence on cross references is not advisable. They may not be available at all and they are never complete. With a given heading in mind it is well to cudgel one's brain for synonymous words or phrases to try,

as well as for variously related subjects, and it is advisable to try these even though entries as expected are found in the first place to which one has turned. Words or phrases with an opposite meaning to the one in mind may serve as subject headings under which desired entries may be found. For example, the searcher interested in viscosity may find significant entries under the heading "Fluidity" in addition to those under "Viscosity." Incidentally, it may be noted that the word "consistency" may serve as a heading for still other entries. Or, some entries under "Electric resistance" may interest the searcher whose thought on turning to an index was of "Electric conductivity." If such related subjects are not suggested by cross references and have not been thought of in advance, they may be suggested by the nature of some entry under the heading first turned to if one is on the lookout for them.

A PRACTICAL MEASURE OF WATER CONSUMPTION

By C. G. Bates

Go into a plantation of yellow pine trees spaced 4 x 4 feet, in which the trees are about 5-6 feet high and the branches of the several trees just beginning to touch one another, and you will find trees which, severed just above the ground, weigh 5-7 lbs. green, and about half as much when thoroughly air-dried. Such trees, on days showing considerably less than the average dryness of summer days at the Fremont field laboratory of the Rocky Mountain Experiment Station, will use approximately 2.5 lbs. of water in a 24-hour period, and it is therefore estimated that on a day of normal dryness they would use as much as 5 lbs. if they could obtain it. The greater part of the transpiration occurs in the period from sunrise till noon.

In other words, a 6-foot tree may require 5 lbs. of water every day, and 2,722 trees per acre, spaced as above, will use 13,600 lbs., or the equivalent of 1.8 inches of rainfall per month. Therefore, without about 2.5 inches per month there is likely to be depletion of the spring moisture reserve, natural pruning (of the lower, older limbs) to reduce leaf area, and natural thinning of the stand as a whole.

Two tests of this kind were made primarily to determine whether somewhat theoretical indications of a difference between species would be borne out by the transpiration rates of normally-developing trees. The accuracy of all the tests was strongly affected by air entering the excised stems before they could be placed in water, and causing a rather marked reduction of transpiration after the first day. Douglas fir trees of the same stature, and more full crowned than the yellow pines, transpired not more than three-fourths as much under the same method of handling.

A series of such tests at different experiment stations would be very interesting. It is understood that the difficulty here encountered can be overcome by cutting the stems under water, but as this is hardly feasible unless the tree has been uprooted, the next best procedure would be to dash the stem into water immediately it is severed.

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Federal Horticultural Board Activities

Within the past year the Pink Boll Worm was discovered infesting cotton fields in the vicinity of what is locally known as the Postvale district in southern Arizona. Promptly the Federal Horticultural Board quarantined Arizona so as to prevent cotton from being shipped inter-state out of Arizona. In cooperation with the Board the State officials, having by law jurisdiction over the intra-state movement of cotton, prevented the shipping of cotton to points in the State outside of the infested area. This special form of cooperation is of great advantage to a partially infested State, because the cooperation really ties up only the infested area, outside of which the Board grants free movement of cotton inter-state.

Immediately, however, certain Arizona real estate and land-promoting interests had the State officials temporarily enjoined, preventing them from carrying out intra-state cooperation with the Board, thus making it possible to move cotton out of the infested territory. These people were, however, promptly notified that the Board's Federal quarantine of the whole State would prevent cotton from moving out of Arizona; that preventing State officials by injunction from cooperating with the Board in no way affected the Federal quarantine, then in full force.

Still undaunted, these real estate interests have just obtained a temporary injunction against the Department of Agriculture to prevent it, through the Board, from enforcing the Federal quarantine against Arizona. The case is to be argued at an early date and the injunction is almost sure to be dissolved, because the law on which the Board's quarantine rests gives ample authority. In the meantime, the States bordering Arizona have issued State quarantines against all Arizona cotton.

Another Immune Native Chestnut Discovered

Hearing of the Service's deep interest in finding, if possible, individual native chestnut trees that have survived the attack of the bark disease, Mr. B. B. Sayer of New York writes that he has such a tree on his farm. He offers to send a supply of nuts from this tree for trial. A test will be made of the nuts at various points within the infested range area of the chestnut, with the hope that the seedlings produced may possess the parent tree's immunity. In a good many cases it is found that individual immunity of a parent chestnut is not transmitted through seed to the next generation.

A New Western Birch Discovered

Major John D. Guthrie has brought to light a new species of birch found growing along mountain streams in northeastern Oregon. Ample specimens and photographs of the tree have been received, and a description of it is soon to be published. The species is to be named in honor of Major Guthrie. He found this birch growing at elevations of from 2,500 to 4,500, and that it attains a height of from 25 to 40 feet, and a diameter of from 10 to 18 inches. The Red Birch (Betula fontinalis) of the Rocky Mountain and northwestern States is a near relative.

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Washington

Impressions of the Land-Grant College Association Meetings

Almost all Station men would have been interested in the subjects discussed at the annual meetings of the Association of Land-Grant Colleges and Agricultural Experiment Stations. Many of the sessions dealt with topics closely allied with our own, and the general problems were very similar indeed to those of the forest experiment stations. One thing particularly that came out continually was the need for better and more adequately trained men. It appears that in agriculture, as in forestry, desirable men with the right temperament, personality, and training, are scarce and the agricultural stations are experiencing the difficulties of expansion without a sufficiently large reservoir of trained and experienced men on which to draw. In their search for men the need for obtaining those having had previous experience in agriculture was emphasized. In fact, it appeared to be generally believed that only men should be procured who have had at least two years' actual field experience in agriculture. This is comparable to our own desire of procuring men who have had some experience in administrative National Forest work.

The value of Advisory Councils was also brought out as a means of preventing the stations from undertaking problems too widely separated from agriculture, as a too common tendency in the experiment stations has been to obtain workers who are more acquainted with the laboratory than with the farm. Problems of great value in themselves often do not bear directly upon the problems of agriculture which a slight modification in the project would bring about. The agricultural councils, in passing upon the programs and in discussing the various projects, have served to bring the farm closer to the station and have assisted in a better rounded-out attack upon the various problems. The correlation of research in one activity with that in another is an important feature. The Advisory Committees serve greatly to bring this correlation about and in suggesting the interrelationship of various lines of attack.

The agricultural experiment stations are finding it increasingly difficult to keep the public and agencies which disseminate information adequately informed as to the work of the station and the results. To this end, the annual program is widely distributed. They have found it necessary for station workers to participate actively in field demonstrations, in meetings and in associations that the station may really become a factor in agriculture and get before the public many facts.

One thing of rather general interest was discussed, namely, the increasing tendency to intensify agriculture. This new agriculture is enabling the farmer to produce the same crops sufficient to supply the increasing demand for agricultural products on the good lands, releasing more of the marginal and poorer agricultural lands for other uses of which by far the greater part will perhaps be for forest. Such a development, as it comes to pass within the next few generations, should have a far-reaching effect upon our forest management and the development of all forms of wild land use.

New Botanical Journal

Of the making of journals there is no end. Now comes the American Society of Plant Physiologists, the Secretary of which is at the University of Chicago, with a quarterly journal called "Plant Physiology." The January, 1926, number was the first issue and its price will be $8 per year. The Secretary of the Society has called it to our attention as some of the stations may be interested in procuring it. For our present organization, the articles so far appearing have been rather heavy reading, and of doubtful value.

Forest Measurements

Most of November was spent on computing volumes for Douglas fir, a large part of which work will be needed in the western white pine yield study that Haig is to bring to Washington this winter. The western yellow pine regional volume table study is nearing completion, there remaining only the compilation of the final tables. Additional time was spent on the mensurational technique study and some additional follow-up work was done on the yield studies for the southern white cedar, the southern yellow pine, and other miscellaneous jobs. Practically 10 per cent of the time in the Computing Section was devoted to the fire statistics study for New England, which is complete except for one State.

Bruce returns to the Forest Service again the first of December and plans for winter work are now well under way.

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Dana completed a preliminary analysis of the forest fire statistics for Connecticut for the past five years and prepared an article for inclusion in the biennial report of the State Forester. The latter later visited the Station to discuss the study in some detail. As a result of this conference, it was decided to work up a special bulletin on forest fires in Connecticut.

Behre spent considerable time in a critical study of a check on the preliminary form class volume tables for red spruce, white spruce, and balsam. The results indicate that the reduction of D.B.H. for bark thickness and butt swell was the most important source of error. Analyses of the figures by localities gave some clues as to what factors do or do not influence the amount of butt swell and the thickness of the bark. The results of this check, supported by separate analyses of the data on bark thickness and butt swell from two field seasons, pointed strongly to the possibility that measurement of bark thickness with the Swedish bark borer gives results which vary consistently from those obtained with hatchet and rule. A field check of the difference in these instruments has therefore been made.

Westveld finished the season's work in the White Mountains, although he made a trip later to attend the management meeting of the White Mountain National Forest officers. Four days were spent in the woods on old cut-over areas and on current sales in the study of silvicultural conditions and marking problems, and the evenings in discussion. One day was spent in going over the numerous experiments conducted by the Station on the Cherry Mountain sale area. A keen interest was displayed in all of the Station work.

Cooperative arrangements have been made between the White Mountain National Forest force and the Experiment Station to study the damage done by the birch borer to birch left on cut-over areas, which is greatly complicating the marking problem wherever yellow and paper birch appear in the stand. Birches of various diameters and crown classes, growing singly and in group, will be tagged and records maintained of their behavior.

Stickel addressed the Syracuse Forest Protection Conference on the importance of meteorological studies in forest fire prevention. At the meeting he had an opportunity to talk informally with a number of Canadians who are interested in this work, and who hope to begin some phase of fire weather study next year.

F. C. Crombie has been transferred from the Boise, Idaho, Weather Bureau office to the Northeast to study forest fire weather forecasting. With Mr. Calvert, chief of the Forecasting Division in the central office of the Weather Bureau, he spent a day at the station about the middle of the month, going over plans for the work in general, and later returned to

work out details of cooperation. His first job will be to establish relations with the various State foresters, and to arrange with them for the obtaining of such additional meteorological records as are necessary in connection with the study. Arrangements have been made to assist him in doing this. The remainder of the winter will be devoted to a study of meteorological conditions in different parts of the region, and more particularly to attempting to find what relation, if any, exists between some of the more important meteorological factors and past fires. By the opening of the spring fire season he hopes to be in a position to start issuing regular fire weather forecasts. At first these will be somewhat tentative but will undoubtedly become more detailed and cover longer periods as the study progresses. Mr. Crombie's work will be tied in closely with the Station's studies of the relation between weather conditions and fire hazard. His headquarters will be in Boston, but it is anticipated that he will spend considerable time at the Station.

R. H. Rogers, New York State College of Forestry, and A. W. Gottlieb and L. S. Altpeter from the Harvard Forest, joined the staff during the month, and are engaged in computation work in connection with the compilation of field data collected during the past season.

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LAKE STATES FOREST EXPERIMENT STATION

Two jobs deserve mentioning in particular; one, the selective logging of the experimental forest at the Upper Peninsula Station, and the other the cutting of the four sample plots of jack pine established on the Superior National Forest.

The logging of the twenty acres was completed except for the hauling. Thirty-five per cent of the volume of the merchantable stand was removed. Only the larger trees, approximating roughly to the diameter limit of 22 inches D.B.H., were cut, netting 45,000 board feet Scribner Decimal C. scale of high grade hardwood logs. These are to be used in the manufacture of woodenware specialties, and bring $38 a thousand for maple and $60 a thousand for birch, loaded on railroad cars. The top logs, the culled butts, and the large limbs were cut into chemical wood down to 3 inches in diameter. Some 300 cords (the number not yet fully determined) were cut on these twenty acres. If the entire merchantable stand were cut, the value of the average log would be only $23 a thousand. In removing 35 per cent of the volume, selective logging removed 60 per cent of the value of the stand. Since only 8 trees were cut on an average to the acre, and the tops and the culled logs were made into chemical wood, there is no slash problem, and if not for the stumps, one would hardly realize that the forest has been cut over at all. There is a thick carpet of hard maple reproduction and a large number of trees from 3 to 22 inches. The total number of trees per average acre between 3 inches and 38 inches before logging was 193. Of these 49 trees were 12 inches and over, and 144 trees under 12 inches. Eight trees per acre above 12 inches were removed. Four trees below 12 inches in diameter were damaged in logging and were

cut into chemical wood. This leaves 181 trees of which 41 trees are 12 inches and over, and 140 trees under 12 inches. At a conservative estimate of 150 board feet growth per acre per year, the amount removed in this logging should be replaced in 20 years. Indications are that the growth will be more than 150 board feet per acre per year, and the volume in twenty years will exceed the original volume.

The methods of cutting plots which were laid out last month in a dense 60-year stand of jack pine on the Superior National Forest, were cut over early in the month through the interest and initiative of the District and National Forest officers. A crew of four men under District Ranger Denley were employed and the cutting, slash disposal, and removal of the wood were completed. Kittredge spent several days completing the tagging and measuring of trees to be left, marking the isolation strips, and measuring some trees as cut. These plots are near one of the traveled roads traversing the Forest and it is planned to have a large sign erected calling attention to them and small signs by each plot giving the essential information about the object and methods. In this way the plots will serve as demonstrations as well as experiments.

Volume tables for white birch were prepared and copies distributed locally. This table included total cubic contents, merchantable cubic contents, and cords.

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APPALACHIAN FOREST EXPERIMENT STATION

General

During a few days visit at the Station Mr. Clapp reviewed the current work and discussed plans for future work. He inspected the field work at the Bent Creek laboratory and with Frothingham and Sims went over the tract in Bent Creek valley designated for experimental use by the Station.

Korstian returned to the Station the middle of the month after completing his detail to the Washington office. While there he made substantial progress on a number of his manuscripts, going over some of them with members of the Washington office. He reports that the detail was very profitable to him for the contacts it gave with the Washington office routine, providing a different viewpoint of the work of the Station. Such assignments of members of the staff are decidedly beneficial to the Station, as well as to the individuals concerned.

Frothingham prepared a brief circular on the work of the Station which was mimeographed and distributed, with the Station's monthly report, to the enlarged mailing list.

Bent Creek Experimental Forest

McCarthy, Buell, and Sims ran a boundary survey and primary control of the area in Bent Creek Valley on the Pisgah, which is to be set apart as the Station's experimental forest. This area of approximately one thousand acres contains a good representation of the types of timber found at similar altitudes in this region. Previous cutting and clearing of land for cultivation have added further variety to the timber types represented. The tract will be carefully mapped to show each type, age class, and historical unit. These will be individually inventoried to determine what tree growth of value is present and what problems are presented in the management of each unit. These problems will later be studied according to a plan of management conforming to the Station's investigative program.

Spruce Regeneration Study

Considerable time was spent by Korstian and Hursh in compiling and summarizing the data obtained in the survey of natural reproduction on cutover and burned spruce lands in the Southern Appalachians. This material is being made available for Frothingham and McCarthy's report on timber growing and logging practice in this region and also for a separate bulletin on the spruce regeneration survey.

SOUTHERN FOREST EXPERIMENT STATION

General

Mr. Clapp spent the last two days of his Southern trip on the Choctawhatchee Division of the Florida National Forest with Forbes, Wyman, and Wakeley.

On November 4 Associate Ecologist L. J. Pessin joined the staff. Pessin had some forestry work at Georgia under Akerman; holds a Ph. D. in botany from Johns Hopkins; has taught that subject at several southern agricultural colleges and has done botanical research in Maine, Jamaica, and Arizona. By no means the least of the stimulating influences of the month has been that of his specialized training and his outlook on many of our problems and methods.

Demmon completed a preliminary forest type map for the Southern States and sent copies to several foresters and other interested persons in the region for correction and criticism.

Among visitors at headquarters during the month was Capt. J. B. Woods of the Long-Bell Lumber Company. The Long-Bell plans to plant 1,200 acres a year for five years in Beauregard Parish, Louisiana. Longleaf will be the species used. Last year's direct sowing of longleaf in the same area was a failure, most of the seedlings dropping out in the summer, which was not abnormally dry.

Protection, Fire

Barrett, released from the Arkansas mill study, spent ten days on the Texas fire plots. The season was too wet to permit a good burn. In the course of painting numbers on all trees to prevent further loss of data through theft of tags, Barrett found that painting four-digit numbers costs us about 3½¢ a tree for material and labor.

Management

Demmon, with Miss Regan's assistance in computations, made substantial progress in compiling the extensive survey material from Louisiana, Georgia, Florida, and Arkansas.

Naval Stores

By conjuring with Miss Gerry's name, the Pine Institute of America arranged a most successful series of six naval stores get-together meetings in the middle and eastern territory. So far as possible these were held in the woods or at the stills, and formal speech making was cut to a minimum. The Starke meeting, which gave us an opportunity to show the industry our own work, right in the woods, was particularly successful from our point of view. We are very grateful to Miss Gerry and the Pine Institute for the opportunities given us by these meetings.

Forestation

The bulk of the month's work dealt with analysis of last year's root and top measurements and the careful lifting and measuring of a large sample of each of four species from this year's beds, in an attempt to find a satisfactory method of comparing groups of seedlings grown under different conditions. To lift 700 seedlings it was necessary to dig, loosening much of the dirt with surveying pins, a hole 3½ x 5 x 12 ft., in heavy soil. Every indication is that root lengths are worth very little when finally obtained, and that in future exact comparisons we can do away with this excessively costly excavating by confining ourselves to lengths of tops and dry weights of tops.

In lifting the seedlings mentioned above, Possin discovered a mycorrhizal association of very general occurrence and possibly great importance on all four species of pine. Additional material will be collected this winter for identification and study.

CALIFORNIA FOREST EXPERIMENT STATION

One of the most promising developments in protection work is the recent experimental fire-line construction in heavy brush on the Shasta by means of tractors and heavy graders. The results of the experiment, in which Kotok participated, have been described by District Forester Show in the Washington news letter. The experimental work is to be continued about January 1 in the heavier southern California brush fields on the Santa Barbara. A cheap method of constructing and maintaining fire lines and motor ways will mean a real advance towards effective fire control in the southern protecting forests and in the lengthy belt of woodland chaparral of the Sierra foothills.

The type mapping being continued by Wieslander in this twilight foothill zone brings out strikingly the difficulty of securing any kind of protection there in the face of adverse physical obstacles and local public opinion. The excessively dry summer resulted in a vast area being burned outside the Forest boundaries. Extension of the usual fire season into late autumn favored a vigorous revival of light burning activities throughout this zone. The resulting burned area represents a nearly continuous strip along the foothill front from the Sequoia to the Shasta.

On November 19 Kotok attended a conference with District Forester Show, leading lumbermen and officials of protective associations intended to clarify the provisions of the public requirements bulletin for the pine region. About three weeks of Kotok's time will be taken up with the District Board of Fire Review. The Sequoia and Stanislaus Forests have been covered thus far.

California continues to maintain its records for unusual weather. November provides a gratifying wet variation to the monotonous story of deficient rainfall that has prevailed for almost ten years. The rainfall for the month in many places was the heaviest recorded during a period of 75 years. In the foothills east of Modesto the storm assumed proportions which called forth the name "cloud-burst." For a short period a funnel-shaped cloud, or whirling spindle of rain, gave a mild imitation of a Kansas cyclone. A comfortable blanket of snow covers the Sierra. The size of squirrel hordes and other "signs" have stimulated amateur prophets to predict a good old-fashioned wet winter.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

With all hands in town, November was given over to office work. Simson came to Portland for five months, leaving a Columbia ranger occupying the Wind River laboratory and caring for the other buildings, the daily weather observations, etc.

Westveld with two computers to help him got a large part of the routine compilation completed on the hundred or more brush disposal plots he surveyed intensively this season. He spent a week with A. C. McIntyre on the latter's brush disposal study at the Southwestern Experiment Station.

Isaac spent considerable time arranging the permanent office records of the various reproduction studies, including the working up of forms and maps, and recording the first of several series of photographs to be repeated periodically. The first progress report of the Douglas fir thinning study at Wind River was completed. It covers the first five years following thinning in a ten-year-old stand. The figures indicate little change during this period. Diameter growth was only slightly greater and the height growth was less than on the unthinned area.

McArdle divided his time between the Douglas fir yield study and fire studies. As a preliminary to writing his bulletin on Douglas fir yields he has assembled about 125 references to Douglas fir supplementary to those included in the mimeographed bibliography on that tree prepared in Washington. All the lightning storm reports for the past three years have been coded and are ready for the punching machine.

Meyer spent the whole month continuing the computations on the permanent sample plots in second growth Douglas fir. There is now a good distribution of plots among site classes, ranging as they do from Site I to Site IV. The change in method of measuring diameters from calipers to diameter tape has caused some discrepancies which can be only partially accounted for. Corrections deduced from McArdle's observations on calipers versus diameter tape measurements were applied to obtain more comparable values. A study of the normality of the plots expressed in percentages of yield table value failed to reveal much. The trend of stem distribution in stands was found to be from a skewed form to a more normal distribution. In one case where the original stand had apparently two frequencies, one for the small diameters and the other for the main stand, a steady progression to a single frequency curve was observed.

Our photograph collection has been enriched by about 350 usable pictures taken this season by members of the Station. All are 4x5 and taken with focusing cameras. The file copy of each photograph is pasted on a $6\frac{1}{4}$x$9\frac{1}{2}$ stiff manila envelope which contains the duplicate prints. The number, file designation and subject of the print are typewritten above the picture on the envelope and the prints are filed subjectively according to the scheme for investigative projects.

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The first week marked the end of the field season. Field work early in the season received an unusual setback due to our participation in fire fighting, and for this reason a special effort was made in field work during the fall. Most of the regular members of the staff took active part for various periods in this work, and four field assistants were occupied with it most of the time. As a result of this and the early season's work, 15 permanent sample plots and 200 permanent reproduction quadrats were established at the Priest River center. The sample plots include 6 yield, 3 methods-of-cutting, 2 reproduction-after-fire, 2 pruning and yield, 1 thinning, and one virgin timber plot. The reproduction qyadrats include 140 in connection with methods-of-cutting, and 60 in connection with regeneration after forest fires. Altogether there are now 28 permanent sample plots at the Priest River Experimental Forest and 18 at the Coeur d'Alene center.

Despite the bad fire season very good progress was made in the field work of the western white pine yield study. The sample plot data are now sufficient to proceed with the compilation necessary to formulating the final yield tables. This work was begun in earnest early in the month with a special force of computing clerks used to get the material in shape for Haig to take to Washington. This is a comprehensive job due to the complexity of the western white pine type and the fact that there have been no second growth volume tables for the half-dozen or more species that comprise the characteristic western white pine stand. The preliminary plotting of volume table data for western white pine, larch, Douglas fir, white fir, hemlock, and cedar is being done preparatory to being sent to Washington for the remaining steps of compiling the volume tables. To date measurements have been plotted for western white pine, Douglas fir, white fir, and hemlock. Measurements for 380 western larch have already been plotted and the cedar measurements remain to be done. In connection with the compilation of the yield data proper, the work so far has included computing plot areas, drawing height curves, and transferring sample plot data to the final compilation sheets.

Gisborne made a little study in humidity and temperature readings at the Experiment Station lookout, elevation 6,000 feet, during the past summer which may be of interest to other Districts and Experiment Stations attempting to measure relative humidity at high mountain weather stations.

It was found that measurements of relative humidity were very difficult to make accurately at this station because of the rapidly fluctuating temperature. A series of readings, made two hours apart during the daylight hours, plotted very irregularly and even the general trend frequently failed to agree at all with similar measurements made at the Experiment Station proper, six miles away, and 2,600 feet lower in elevation. The causes of these differences apparently lie in the changing air currents sweeping up over the lookout, coming from different basins below.

A thermograph installed at the lookout station showed frequent increases or decreases of temperature amounting to as much as 8 degrees F. Naturally humidity varied considerably as a result of these fluctuations which were often so abrupt that the observer could not tell from his sling psychrometer what the correct wet bulb and dry bulb temperatures might be. A study of these conditions indicated that during the daylight hours the air rises from the lower surrounding basins, due to heating below, and flows upward and past the lookout station. At times the uprush might be from a basin having a southerly exposure, bringing air of higher temperature and lower humidity. A slight change of the regional winds, or the suction created by this uprush from the southerly basin, might then pull up air from a basin having a northerly exposure. Markedly lower temperature and higher humidity immediately occurred at the lookout when this new supply of air rushed across it. The thermograph record and the observations of wind direction showed that these changes were very frequent and very abrupt. Naturally any measurement with a sling psychrometer, requiring several minutes of time, might catch the conditions changing and be difficult to make accurately. Naturally, also, two or three successive measurements often disagreed very materially.

The remedy apparently lies in the use of a thermohygrograph, determining the average tendency of the curve rather than the exact reading at any particular instant. If such expensive instruments cannot be provided, then at least four successive readings should be made with the sling psychrometer and the average determined.

Wahlenberg made observations of the condition of natural reproduction growing under brush, especially Ceanothus, as compared with that growing in adjacent open spaces. In this connection photographs were made of trees standing close to the root collar of bushes. This work is related to an existing study to determine how close to bushes trees should be planted. The observations are to be worked up this winter.

Soil reaction tests were made on the lower bench at Savenac Nursery. This part of the nursery was found to be strongly acid in the spring of 1924 and was limed in the spring of 1925. The tests now show it to be slightly acid or almost neutral, except for a few high spots which are alkaline.

In order to have a sufficiently large drying oven for conducting the laboratory work on a large number of plants from the fertilizer experiments, Wahlenberg spent several days in Missoula. The University of Montana forest school permitted the use of its large electric drying oven for this purpose.

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On November 1, Bates gave a lecture on "Habits of Colorado Conifers" before the Colorado Research Club in Denver, a women's organization with very broad interests. Lantern slides were used extensively, and besides depicting the botanical characters by which the trees may be known, considerable opportunity was afforded for describing the silvical characters of the trees so that they became more markedly individual. One of the leaders of the Club expressed mild resentment that time should be given to discussing "utilitarian" values of the "beautiful" trees of Colorado, but it seems high time that people of a certain leisurely class should learn that forestry isn't all sentiment.

The main work at the Fremont field station was completed on the 17th. Drying of the sand, so urgently needed to install the nutrient tests in Project T-5, was very slow owing to inclement weather, and this necessitated going back for an additional day to install all of the tests for which material was available. Even so, the series installed was not as complete as had been planned, but should give some basis for deciding (1) what range of nutrient solutions may most profitably be used in more comprehensive tests, and (2) whether Nebraska sand after washing with alkali and acid, is sufficiently sterile (free of its own nutrients) to be safely used to carry measured supplies of salts. The points which make its use so desirable are fineness and water-holding capacity. Ground quartz, the most sterile medium known, is in these particulars very unsatisfactory, and it may show other disadvantages.

Photographs of the material produced in the last lighting test (T-8) were made and this material was then divided between two cooperators who have expressed a desire to examine it with reference to starch production, namely Miss Long of the Carnegie Institution and Prof. Rogers of Colorado Agricultural College.

On the 18th, Roeser and Bates went with State Forester Morrill and State Extension Forester Lee to the Black Forest, where plans were made for handling a section of school-land timber as a demonstration forest, and one or two small plots for intensive growth measurements. The installation of these plots, a few days later fulfills for the present the plans we have had for some time for thinning experiments in that locality. The larger area will be handled entirely by the State Forester and it is expected he will cut it very carefully, subordinating revenue from ties to the improvement that can be made by cutting post, prop and fuel material from the over-dense stands which are typical of the locality.

One day was spent by Bates in the plains region in connection with the tree-planting contest among the country schools. With the exception of one case where large conifers were planted, without sufficient care in handling, the planting of 1926 appears to have been highly successful.

The latter part of the month has been spent by Roeser in working up recent data on the heat resistance of seedlings, and by Bates on the tolerance study, both subjects to be presented in papers at Philadelphia if the final analyses seem to justify public announcements of the results.

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SOUTHWESTERN FOREST EXPERIMENT STATION

The station force is now comfortably settled for the winter in its Flagstaff quarters. Thus far, however, there has been little in the weather to suggest the approach of winter. Advantage is being taken of the open roads to finish a few odds and ends of field work before settling down to the steady grind of the office.

Krauch, Wittorff and Arocha are busily engaged in compiling and transcribing sample plot records. It is always a race to dispose of the old data before the next year's crop is brought in.

R. H. Westveld of the Pacific Northwest Forest Experiment Station spent a few days here studying brush disposal and comparing notes with MacIntyre who has been working on this problem during the past two years.

An article entitled "Should Forests be Grazed?" was submitted during the month for publication in the Yearbook of the Department of Agriculture.

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STATUS OF MANUSCRIPTS RECEIVED

Appalachian

"Natural Replacement of Blight-Killed Chestnut." C. F. Korstian and P. W. Stickel (To Jour. Agr. Res.)

"Weather and Forest Inflammability in the Southern Appalachians." E. F. McCarthy. (To Mo. Wea. Rev.)

"Work of the Appalachian Forest Experiment Station" (Mimeographed summary of more important problems and projects.)

Southwestern

"Should Forests be Grazed?" G. A. Pearson (For Yearbook).

Washington

Bibliography - Mimeographed. "Slash Disposal from an Entomological Standpoint." F. C. Craighead.

"Where is the Forest Biologist?" E. N. Munns. (To Jour. For.)

Northern Rocky Mountain

"Investigations in Chemical Weed Control at Savenac Nursery." W. G. Wahlenberg.

"Objectives of Forest Fire-Weather Research." H. T. Gisborne. (For annual meeting of S.A.F.)

Pacific Northwest

"Wind River Thinning Studies." Plots 1-5 Progress Report No. 1, November, 1926. L. A. Isaac.

"What We are Learning About Silviculture in the Douglas Fir Region." (Paper read before Western Forestry and Conservation Association Annual Meeting.)

In Print

Dunning, Duncan. "Predicting the Second Cut in National Forest Management Plans. (Jour. For. November, 1926.)

Wyman, Lenthall. "Preliminary Naval Stores Yield Tables." (Naval Stores Review. Nov. 13, 1926.)

"A Forest Type Classification for the Southern Appalachian Mountains and the Adjacent Plateau and Coastal Regions." By a Committee of the Southern Appalachian Section, Society of American Foresters. (Jour. of Forestry, October, 1926.)

Frothingham, E. H. "The Regeneration of Appalachian Hardwoods." (Pulp and Paper Magazine of Canada, November 18, 1926.)

Korstian, C. F. "The Economic Development of the Furniture Industry of the South and its Future Dependence upon Forestry." (North Carolina Department of Conservation and Development, Economic Paper No. 57.)

Forbes, R. D. "The Place of Timber Growing in the Development of Louisiana and South Mississippi." (Extension Cir. 89, Part II; Louisiana State Univ.)

Hadley, E. W. "A Preliminary Study of the Growth and Yield of Second-Growth Tupelo Gum in the Atchafalaya Basin of Southern Louisiana." (Lbr. Tr. Jour.)

Demmon, E. L. & E. W. Hadley. "Review of H. H. Chapman's "Factors Determining Natural Reproduction of Longleaf Pine on Cut-over Lands in La Salle Parish, La." (Jour. For. Nov., 1926.)

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Sawmill Studies

In preparation for an article on comparison of sawing methods, the results tabulated below were secured. The comparison is between mills, one of which employs an up-to-date method of taper sawing, while the second does not use this method in its sawing practice.

Both mills are equipped with sawmill machinery and are cutting timber of approximately the same age. In both cases logs are transported to the mills by rail. The values are based on Western Pine Manufacturers Association 5-year averages. With regard to the increase in value per M and in overrun per cent (#5 & Btr.) it should be noted that use of this method of tapering logs at the headsaw does not increase the sawing time.

Western White Pine -- Scund 16' Logs

Method	No. of Logs	Top Dia. Range (ins.)	Wt. Av. Taper (ins.)	Wt. Av. Sawing Time (sec)	Wt. Value ($) Per M ft. Lbr. Tally	Wt. Av. Overrun #5 & Btr.	Wt. Value Per M Ft. Log Scale
No.1	138	15" -26"	2.00"	111	$47.82	27.62%	$61.03
No.2	300	15" -26"	2.00	114	44.22	17.65%	52.02
					$ 3.60	9.97%	$ 9.01

Note: Method No. 1 - Up-to-date method of taper sawing.
" " 2 - Taper sawing not practiced.

In the computations scund logs of the same top diameter, length, log grade, and log position in the tree were compared. The two runs were placed on the same size basis by weighting each diameter group on the number of logs which were found in No. 2 run (Method No. 2).

Air Seasoning

Considerable preliminary work on the proposed Departmental publication "The Air Seasoning of Western Softwood Lumber" has been accomplished during the past two months. A tentative outline was prepared late in September. During Fullaway's recent visit to Districts 5 and 6, this outline was discussed and revised as the result of discussions with the Products men in these Districts. In visiting some 40 drying yards and about 50 mills and remanufacturing plants in Washington, Oregon, and California, it was possible for Fullaway to secure the necessary first-hand knowledge of air-seasoning practices and problems in the Douglas fir,

California pine, and redwood regions. It is planned to have the first draft of the manuscript completed early in March. This will permit revision prior to the Annual Products Conference at Madison during May.

Lumber Prices and Movement

	Annual 1925	First Q. 1926	Second Q. 1926	Third Q. 1926
Idaho White Pine	$37.37	$37.10	$38.65	$37.47
W. Yellow Pine	28.02	29.33	28.14	24.87
Larch-Fir	19.33	19.33	18.05	17.40
White Fir	20.14	19.79	19.86	18.60
Spruce	24.38	23.60	25.68	22.58

	October, 1925	October, 1926
Cut	184,711 M	153,922 M
Shipments	147,565 M	162,503 M

Hog Fuel

There are apparently several opportunities in the Inland Empire for the utilization of sawmill waste by the development of markets for hog fuel. Centers such as Spokane, Missoula, and Potlatch offer possibilities. While in the Douglas fir region, Fullaway was able to get some information on this matter which will be put before the industry of this region in an attempt to promote the use of hog fuel.

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FOREST PRODUCTS, DISTRICT 5

Air Seasoning

During the first half of the month, Mr. Hill accompanied Mr. Fullaway of D-1 and Mr. Gibbons of D-6 on a trip covering the California mills, both pine and redwood, at which air seasoning work was conducted. The object of the trip was primarily to acquaint Mr. Fullaway with local air seasoning conditions in connection with his proposed bulletin on "Air Seasoning of Western Softwood Lumber." The extent to which the recommendations of the report of this District on the air seasoning project have been carried into effect in the pine region was gratifying. In the redwood region there is still need for much missionary work.

Lumber Census

In preparation for the next census the annual request was issued to Supervisors for bringing up to date our information on California sawmills.

Miscellaneous

Little other project work was accomplished except Mr. Hill's time on the final stages of the publication of the Marine Piling report. There was, however, an epidemic of inquiries, both from the public and from the Forest Products Laboratory.

Commercial utilization of sawmill waste seems to be receiving a largely revived interest. A project at Eureka for the conversion of redwood waste into power with certain interesting by-products has already progressed to a stage of contracting for the total waste of several large mills in that city. An inquiry in respect to the utilization of redwood waste was also received from an engineer named Thompson from Portland who is employed by the backers of the Stafford distillation process and calls were received from Sanderson and Porter, industrial engineers of this city, who have in view a large hydroelectric development in the Grays Harbor country of Washington. This latter case is interesting inasmuch as they have become convinced that the marketing of their hydroelectric power in that region depends upon the establishment of supplemental industries for the utilization of the sawmill waste produced by the large number of mills in that region.

Correspondence involving considerable time and study was had with the Laboratory in respect to a proposed study of the white ant damage in Southern California, the Burbank Royal Walnut, and the Somoza fire retardant paints. The latter product has been taken over by the E. K. Wood Lumber Company which has erected a dipping plant at Los Angeles and reports considerable business. They are combining a waterproofing treatment with that for fireproofing. More detailed information will be sought on the next visit of a member of this office to Los Angeles.

Arrangements were also made for obtaining white and red fir material for box tests for the Laboratory.

Interest in dipping methods for controlling blue stain is rapidly increasing among the lumber industry. At present it is centered on the Ford Wyandotte alkali and the German product called "Fungimors." The time is propitious for experimental work on blue stain prevention, and it is unfortunate that such work cannot be undertaken.

Assistance and some investigation was also undertaken for the Office of Operation in respect to District paint specifications.

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FOREST PRODUCTS - DISTRICT 6

Air Seasoning Study

In connection with the preparation of a bulletin dealing with the air seasoning of lumber in the West, Messrs. Gibbons, Fullaway and Hill spent more than two weeks in the western yellow pine and redwood regions of California. At practically every yard it could be seen that the air-seasoning study of the Service is bearing fruit, as evidenced by more open yards, higher foundations, more open piles, and better care of the lumber in general; this should be particularly heartening to Mr. Hill. At the Sugar Pine Lumber Company, Fresno, the yard practice is noteworthy. Here where climatic and local conditions seem to be outstandingly favorable for fast drying, the company may be doing more than any company in the West to accelerate drying and fight blue stain; in fact, in an effort to facilitate drying the company may be in the way of getting a needless amount of degrade from checking, especially in the case of white fir. It was good to observe the yard practice of the Sugar Pine Lumber Company; the company is actually doing things that many of us believe in but which we have hesitated to recommend for fear that some one might think we had a brain storm.

During a recent visit at the Mill B plant of the Weyerhaeuser Timber Company, Everett, Washington, Mr. Johnson noted that this concern is now segregating its two-inch Select Common Douglas fir stock 8 inches and wider from its No. 1 Common and piling it on special 1 x 4" stickers. During the course of the air seasoning study at this plant in 1923 and 1924 it was shown that a loss of about 20 per cent from season checks resulted from self-sticking the Select Common. On the other hand, the loss through self-sticking the two-inch No. 1 Common was only about one-half of one per cent. The use of the special 1x4" stickers with the Select Common will almost entirely eliminate the loss from season checks in this class of stock, and is a step forward in air-seasoning practice. This is just another straw indicating that the air-seasoning study has really been helpful to the industry.

Incidental to the general air-seasoning study, last July a test was initiated at the cold-seasoning plant of the Standard Seasoning Society of Cottage Grove, Oregon, to determine the efficacy of the so-called "cold-seasoning" process in the drying of "clears." The test lumber included 1, 2, 3 and 4-inch clears 8 to 16 inches in width. The average moisture content of the green stock (July 24) was 30.6 per cent. The moisture content at the close of the test (November 17) was 23.3 per cent, as shown by the 16-inch current drying samples. The lowest moisture content reached was 20.6 per cent on September 28 and since that time there has been a gradual moisture pick-up. The final report covering this test is now in preparation.

General Survey of Woods Waste in the Douglas Fir Region

While in attendance at the Pacific Logging Congress held in Vancouver, B. C., Mr. Hodgson discussed the wood waste survey with Mr. J. L. Alexander, Assistant Forester in the British Columbia Forest Branch, particularly certain phases of the study. It came out that the British Columbia Forest Branch intends to continue its study of woods waste.

The office work of computing the tally sheets was started and good progress was made. The methods to be used in working up the data are requiring considerable thought. The computation of waste material in stumps, for example, involves several factors, when the waste is expressed in board feet. We believe to express the waste in board feet will prove more effective than to measure it in cubic feet.

Little-Used Species Study

For distribution in Oregon and Washington, 1900 copies of Bulletin No. 1437, "Red Alder of the Pacific Northwest," by Messrs. Johnson, Hanzlik and Gibbons, have been received.

Publications

Word was received from the editor of the Sunset Magazine that Mr. Hodgson's article "Forest Thrift" contained valuable material, and that with certain changes he could probably use it in Sunset; also perhaps place parts of it in other publications. So as to give the contents of the article as wide a circulation as possible, the editor was authorized to make certain modifications.

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The following tabulation is probably the only existing estimate of the varying lengths of haul by rail required to distribute the lumber cut of the United States. The fact that the estimates of two different years based on different methods agree fairly well seems reason for believing that the actual average haul is not far from 700 miles. The apparent doubling of the rail haul since 1914 is a matter of no great surprise on account of the increasing percentage of the lumber consumed derived from points west of the Great Plains. The fact that the average haul for 1923 is 25 miles greater than that for 1924 may be a mathematical accident. On the other hand, it may be a true indication pointing to the fact that in their desire to escape from the burden of increasing rail rates, producers and consumers have adopted expedients to defeat the long rail haul, such as the extensive transportation by sea of north Pacific softwoods both to the Atlantic Coast and to California. The increase of this sea traffic, which has become so pronounced in 1926, would tend to reduce correspondingly the length of the average rail haul.

It may be that the peak of long rail hauls has been passed. That is not probable, however, because there are many important internal States which can only be served by rail traffic and which probably will become increasingly dependent upon softwoods from Washington, Oregon, and British Columbia as eastern sources decline.

December 6, 1926.

Lumber Transportation: Estimated Average Length of Rail Hauls, 1923[1]

Region	Direction of Rail Traffic: In-bound Miles	Out-bound Miles
Northeastern	840	180
Lake	910	415
Central	890	405
N. C. pine	300	360
Southern pine	250	685
Pacific (north)	255	1,275
Pacific (south)	560	755
Rocky Mtn. (north)	420	850
Rocky Mtn. (south)	820	610
Prairie	1,515	300
U. S. Average	725	725

[1]Computed by multiplying the quantities shipped by rail inter-regionally by the actual rail length of typical hauls. Other estimates for 1924, based on the average charge per M feet for rail haul, show 700 miles for softwood and hardwood taken together, 840 miles for softwood alone, and 440 miles for hardwood alone. The average rail haul of lumber has practically doubled in 10 years, as in 1914 it was estimated to be 360 miles. The cost of transporting lumber by rail averages considerably less than 2 cents per mile per M feet.

FOREST TAXATION INQUIRY

The month of November was spent in St. Paul, working up the field data with especial reference to the use of statistical methods of determining market values of lands examined in the field.

L. S. Murphy left for Washington, D. C., after completing a report on the financial statement for St. Louis County. R. C. Hall left for Washington, D. C., to undertake the preparation of data on market values of stumpage and cut-over lands.

On November 26 a conference was held at Madison, Wisconsin, attended by Dr. F. R. Fairchild, H. H. Chapman and Paul A. Herbert, with Dr. B.H. Hibbard and W. A. Hartman of the Agricultural Engineering Department, University of Wisconsin, to arrange for cooperation with the University in a study of taxation of forest lands in that State, which has been underway during the past season under Mr. Hartman's direction.

Stumpage Prices

A tabulation of second-growth pine stumpage prices by States in the South Atlantic and Lower Mississippi States brings out the importance of regional accessibility as a determinant of stumpage prices. Prices in States near large consuming centers are much higher than those far away, as illustrated in the following table.

Stumpage Prices of Second Growth Southern Yellow Pine, by States

State	Price per M	State	Price per M
Delaware	$9.70	Florida	$1.88
Maryland	8.97	Alabama	2.52
Virginia	5.60	Mississippi	2.22
North Carolina	5.27	Arkansas	4.04
South Carolina	4.02	Louisiana	4.57
Georgia	3.41	Oklahoma	1.93
		Texas	3.77

The difference in price among the States in the Lower Mississippi Valley group is largely due to local or tract accessibility. The sales in Alabama and Mississippi ran to relatively large areas not easily accessible, while those in Arkansas, Louisiana, and Texas where prices are relatively high were small accessible areas.

In all States the distance between the mill and the timber tract was mostly three miles and under. A relatively small percentage as compared with the first group fell in the mileage group of from three to five miles. Only the exceptionally large transfers of second-growth timber were

included in mileage groups above five miles. In the northern part of the South Atlantic group of States very few sales were involved which were located more than three miles from a sawmill.

These prices are for all species of second-growth pine. It was impossible to segregate the reports to bring out species differences in prices. The few reports that showed species indicated but slight price differences between species.

Average Lumber Cut per Mill by Regions

A recent tabulation of the number of sawmills operating in the Lake States, Lower Mississippi region, and Pacific Northwest in certain specified years shows some interesting comparisons. In the Lake States in 1899, 234 mills had an annual cut of over 10 million feet. In 1924 but 83 cut over 10 million feet. In 1899 in the same region 645 mills cut from 1 to 10 million feet. In 1924 only 102 mills fell into this class.

In the Lower Mississippi region the number of mills cutting over 10 million feet in 1899 was 156. In 1909, which is near the peak of the softwood cut of the region, 304 mills of this class were recorded. In 1924 there were 311 such mills in operation. The last figure included a much larger percentage of hardwood mills. In the case of mills cutting from 1 to 10 million feet annually the 1899 and 1924 number are about the same at 900, while the 1909 tabulation showed a total of over 1,500 mills. The period covered shows an increase to a peak and a subsequent decrease from that peak to about the level which existed at the beginning of the record.

In the Pacific Northwest 1909 seems to be the peak of the number of mills cutting from 1 to 10 million feet, with a total of 481 mills. In 1924 the Census reported 272 mills in this class. On the other hand, there has been a steady increase in the number of mills cutting over 10 million feet per year, rrising from 53 in 1899 to 232 in 1924. Many mills in the last class cut much more than 10 million feet per year.

With the decrease of larger mill units in the Lake States and the Lower Mississippi region, an increase in the number of mills cutting less than 1,000,000 has undoubtedly occurred. The records of the Census are not sufficiently conclusive to show this, however.

Production of Newsprint Paper

The monthly production record of newsprint paper in the United States and Canada combined has been broken so many times during the past two years that now a new record attracts no attention. However, it is interesting to know that the total North American production of newsprint in October of the current year exceeds any other monthly record. Three hundred twelve thousand one hundred eight tons of newsprint paper were produced in October, 15,000 tons more than the August record.

The consumption of newsprint is keeping pace with production. There seems to be no tendency for an accumulation of stocks at the mills or in the hands of the publishers. It is problematical how long this constant increase in production and consumption of newsprint paper can be maintained. New mills are being opened in Canada and many mills are extending production facilities, indicating still further increase.

Mason Fibre

Recent reports from the manufacturers of masonite indicate that the process is operating satisfactorily on a commercial scale. The process is similar to that used in the expansion of rice or wheat for well-known brands of breakfast foods. It involves the sudden release of extremely high steam pressure which breaks the wood up into a fibrous condition. The product is now used for the manufacture of a board known as "masonite," used as a substitute for lumber. The company is controlled by lumber manufacturers who maintain line yards in connection with their lumber operations. Masonite is being sold through these line yards. Reports indicate that the company has had no difficulty in disposing of production to date.

The adoption of this process to paper manufacture is being worked out. The Mead interests are particularly interested in this process and are carrying on intensive research at the present time. Indications point to the fact that the fiber will prove suitable for the manufacture at least of coarser grades of paper.

Pulpwood Consumption and Wood-Pulp Production

The Bureau of the Census has released preliminary figures on the 1925 pulpwood consumption and wood-pulp production. The following table shows these figures by States.

Wood Consumed and Pulp Produced, by States; 1925 and 1924

State	Pulpwood consumed (cords)		Pulp produced (tons of 2,000 pounds)	
	1925	1924	1925	1924
United States	6,093,821	5,768,082	3,962,217	3,723,266
Maine	1,240,340	1,234,172	917,632	895,451
Wisconsin	1,071,139	1,071,284	599,601	609,081
New York	904,283	905,767	770,777	755,156
Pennsylvania	423,823	406,866	224,399	216,862
New Hampshire	370,318	269,391	217,489	151,863
Virginia	288,206	268,946	145,619	136,105
All other States	1,795,712	1,611,656	1,086,700	958,748

For the first time imported hemlock and balsam fir are given separately by the Census. The consumption of hemlock totaled 1,334,814 cords of which 21,705 cords were imported. In the case of balsam fir the total consumption was 267,190 cords of which 52,590 were imported. The amount of imported spruce consumed in 1925 was approximately 70,000 cords under the 890,523 cords consumed in 1924. The consumption of domestic spruce, however, increased to 2,253,219 cords, an increase of 174,000 cords over 1924. The consumption of yellow pine for paper manufacture continued its upward trend. The total of 531,157 cords consumed in 1925 is almost 100,000 greater than the consumption in 1924. In the hardwoods, yellow poplar is showing a constant increase. The 146,000 cords consumed in 1925 is 18,000 cords greater than the 1924 consumption. The consumption of slabs and mill waste seems to be increasing; 156,000 cords were consumed in 1924 as compared with 119,000 in 1925.

In 1925 spruce made up slightly more than 50 per cent of the total amount of wood consumed for pulp manufacture; hemlock 17 per cent; and yellow pine 9 per cent; balsam fir 5 per cent; poplar or aspen both domestic and imported, 6 per cent; and yellow poplar 2½ per cent.

In 1925, 3,962,217 tons of wood pulp were produced which is approximately 240,000 tons greater than the 1924 production. All kinds of pulp showed an increase in production in 1925 over 1924 save mechanical pulp. The total increased production in per cents between the two years was 6.4. Mechanical pulp showed a reduction of .8 per cent, while sulphite increased 8 per cent and soda 7 per cent. Sulphate pulp, which has shown a constantly increased production since 1914 when the first records were made, increased 36 per cent between 1924 and 1925. This is accounted for by the installation of new mills in the South which are making sulphate pulp for conversion into wrapping paper and boards. This rapid increase in sulphate pulp production if maintained will soon make the United States independent of imports for our sulphate pulp requirements.

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GRAZING RESEARCH

Washington

Meeting of Association of Land-Grant Colleges

Mr. Chapline attended a number of the meetings of the Association of Land-Grant Colleges which were held in Washington, November 16 to 18. The proceedings of the convention as a whole were characterized especially by consideration of the economic and sociologic conditions of farming and rural life and of ways in which the land-grant institutions may aid in the adjustment of agriculture to these conditions. The meetings afforded an opportunity for discussion of experimental work of the western agricultural experiment stations and of the range extension program.

Reindeer Bulletin

Department Bulletin 1423, "Progress of Reindeer Grazing Investigations in Alaska," by Lawrence J. Palmer, Biologist, In Charge of Reindeer Investigations of the Biological Survey, was received during the month. Mr. Palmer was formerly in charge of Grazing Studies in District 4. This publication constitutes a second report on the reindeer investigations which are being conducted by the Biological Survey and treats particularly of the forage and range management phases. It should, therefore, be of interest to all grazing men.

Status of Manuscripts

Mr. C. L. Forsling's manuscript, "The Relation of Herbaceous Vegetation to Surface Run-off and Erosion on High Mountain Watersheds," has now been reviewed by the members of the Board of Review.

Visitors

Among the visitors who dropped in to discuss various phases of the work during the month were Director James T. Jardine of the Oregon Agricultural Experiment Station, Corvallis, Oregon, formerly in charge of the Office of Grazing Studies; President H. L. Kent of the New Mexico Agricultural College, Las Cruces, New Mexico; Mr. A. C. Cooley in charge of the Office of Demonstrations on Reclamation Projects of Salt Lake City, and Dr. Eloise Gerry of the Madison Laboratory.

Study of Sources of Livestock Feed in the West

Mr. Chapline spent some time during the month working with Mr. Eugene Merritt of the Extension Service in developing statistics of sources of livestock feed in the West. These statistics aim to show by States the

total feed requirements for each class of livestock, the amount furnished each class from harvested crops and sources of pasture for all classes divided into plowable and other farm pasture and National Forest and other ranges.

It is expected that the preliminary analysis of these statistics will be completed shortly and they will then be available in mimeographed form for distribution and further check by all interested parties. Their main value has been to give a broad, general view of the importance of range land in the West from which it is found that approximately 70 per cent of the feed for all classes of western livestock is secured. This, of course, has tended to strengthen the range extension program.

Forage Investigations

Dayton marked the eleven examination papers and their accompanying theses for the Junior Plant Ecologist examination. Four appear to have passed the examination, one having military disability. The theses brought considerably higher grades than the examination and saved the day for two candidates, by an odd coincidence, however, the candidate who received the highest grade in the examination got the lowest grade in the theses. The examination covered a rather wide range of systematic, physiological, morphological, and ecological questions. Perhaps the title led the applicants to the belief that only ecological questions were to be asked or else the schools are falling down in their courses in fundamental systematic botany; at any rate, the replies to the taxonomic questions were decidedly of the "not so good" order, although one of the candidates "killed" most of them, seeming to show that they were not too hard to answer.

Some time during the month was spent on the mss. for the Southwestern forage plant bulletin, to be gotten out in cooperation with Mr. Talbot of the Bureau of Plant Industry.

The glossary of common botanical terms was completely revised, and about doubled as to size, in order to incorporate recommendations of the Board of Review; a few additional illustrations have also been added. The mss. is now being retyped.

During the month 526 plant specimens, representing 13 collections, were forwarded to the Bureau of Plant Industry for determination, and 5 collections were reported on, with notes and lists, to the field. At least 1,000 specimens were filed in the herbarium during the month and 275 were mounted.

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JORNADA RANGE RESERVE

Range Conditions and Precipitation

The growing season this year terminated with the first killing frost which occurred the first week in November. This is later than usual since frosts of this character generally occur during the last two weeks of October. Approximately one inch of precipitation was registered quite generally over the Reserve the first day of November. This moisture has been the means of maintaining the fall weed growth in good condition. Grama grass has for the most part cured particularly well on the stalk this fall so that it will provide palatable winter and spring forage. Growing conditions have been so favorable this season that there are few, if any, types on the mesa portion of the Reserve, which do not show a forage crop of 90 per cent or better. Prospects for carrying the cattle over the winter and coming spring are therefore excellent; in fact at no time during the past 5 years has the Reservation been in better shape to carry stock.

Investigative Work

Work on the clipping studies for this season was closed on November second and the charting of the quadrats which comprise this series was accomplished on the twentieth, terminating the field work on vegetative projects this season. Growth on these quadrats continued this year without interruption since the middle of May, and all quadrats including those clipped at weekly intervals produced forage continuously. In spite of the intensive clipping all quadrats appear to be in a thrifty condition and no appreciable loss in density is apparent for the two seasons these projects have been under way; most of the quadrats show a gain.

The compilation of this season's field data was begun the latter part of the month and an effort will be made to include the results of some of the projects in the investigative Program Report which is due January 10, the date on which the District 3 Investigative Committee meeting is called.

Rodent Control

The Bureau of Biological Survey field party which has been engaged in the poisoning of kangaroo rats since October 10 completed work for this year on November 14. Mr. Gatlin, in charge of the crew, reports that 27,366 acres were intensively treated with 3,689 pounds of poisoned grain. The work has been very effective and it is hoped that the Biological Survey will see fit to continue it on a progressive basis until the entire Reserve has been covered.

Range Improvements

The new boundary signs which were made available through funds furnished by ~~xxx~~ District 3 arrived the first of November. Canfield has been putting them up, the majority of which were posted just prior to the opening of the deer season, November 10. Apparently these signs were quite effective since no hunters were seen on the Reserve during the ten-day season, which is quite in contrast to what occurred during the past two years when the Reserve was overrun with deer hunters.

Visitors and Personnel

Mr. Britton of Socorro, New Mexico, U. S. Game Warden for this State, was a visitor on November 23. He was keenly interested in the closing of the Jornada to hunting and expressed a desire to cooperate in any way possible in matters pertaining to game propagation and conservation and violations of the Federal game laws.

Schoeller was on leave at Santa Fe and Albuquerque for five days during the second week in November.

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SANTA RITA RANGE RESERVE

Precipitation and Growth

During October general rains occurred over the Reserve on the 7th and 30th besides a few scattered showers on other days, with a total precipitation for the month of .75 inches. Accompanied as these were by comparatively warm weather an appreciable amount of late growth took place in Rothrocks and Black Grama as well as other grass species though the latter did not respond so favorably. Such growth as did occur continued up to about the middle of November and even up to the end of the month there were many places where new green growth was still in evidence. So far this winter the lowest temperature recorded at the Reserve Headquarters is 38 degrees above while freezing temperatures have been recorded in the valley along the Santa Cruz River for the past three weeks.

Handling Stock

During October and November counts were made of the stock in pastures 1, 2b, 5, 6, 9 and 10, and will be followed during the early part of January by counts of pastures 2a, 3 and 12. This will practically enable us to start the New Year with a clean slate so far as our pasture records go.

Marketing

Recent sales of cows have been made by Ruelas, Parker and Nicholson in line with the policy of starting in to the winter with a conservative number of stock. From the present outlook there is every reason to believe that there would have been an abundance of feed to carry all the stock through safely with a slight margin to go on but, in the long run, the larger margin of safety provided through these sales, proves to be good business and simply means that the cowman is acquiring so much paid-up insurance, against losses, at no cost whatever to himself.

Natural Revegetation

Such data as has already been worked up from the 1926 permanent quadrats indicates a big increase in density over the previous year for all the perennial forage grasses. Rothrocks grama leads with as high as a 100 per cent increase in many instances. Other species vary from 10 per cent up to as high as 50 and 60 per cent increase. Height growth measurements also show a gain over the previous year. With anything like a good year next year we should begin to get back toward the maximum production of 1919, all of which indicates that there are bright spots even though they may be in a minority over a period of years.

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GREAT BASIN EXPERIMENT STATION

Mr. Forsling has returned to Ogden, after making his fall examination of the range at the U. S. Sheep Experiment Station, Dubois, Idaho. He found that the actual carrying capacity of the range this year as the result of the drought was approximately 50 per cent below the wet year of 1925, 15 per cent below the dry year of 1924, and 35 per cent below average. As the result of the dry condition on the ranges, approximately 40 per cent of the sheep in southern Idaho are on winter feed lots at this time, where ordinarily not to exceed 10 per cent have been removed from the range this early. Special attention is being given in the experiments at the U.S. Sheep Experiment Station to determine what may be done to avoid the early feeding in dry years. The sheep station lands have been improved approximately 20 per cent in carrying capacity in the past six years, and this improvement, together with a conservative stocking has made it possible to carry the several bands of sheep owned by the Experiment Station through the fall season this year, with practically no additional feeding. This indicates what the sheep men of Idaho might expect if their ranges were under control and proper methods of range management were followed.

Difficulties in Plant Identification

This year Mr. Dayton, of the Washington office, and members of Dr. Coville's office of the Bureau of Plant Industry, have been called upon to straighten out a number of taxonomic tangles among some of the more common plants occurring in the vicinity of the Station. The Great Basin Experiment Station has its full share of taxonomic difficulties due to intermingling of floral elements of diverse geographic origin. Central Utah, where the Station is located, is somewhat of a meeting place between the characteristic flora of the northern and southern United States as well as of the eastern and western flora of the country. This appears to introduce somewhat of a "twilight zone" between the species of a number of genera. The chief difficulties so far have been between Agropyron tenerum and A. violaceum, A. smithii and A. riparium; Stipa columbiana (=S. minor), S. columbiana nelsoni and S. lettermani; several of the herbaceous species of Artemisia; two or more species of Agoseris; and several of the mertensias and pentstemons. Some trouble has been experienced also with the polyanthus-marginatus-carinatus group of the genus Bromus. Seed of B. "marginatus" from Colorado and of B. carinatus from California have been obtained and sown at the Station for comparison with the local B. polyanthus when all are grown in the same habitat. The study of the effect of environment upon the characteristics of closely related species is a very interesting one and considerable time could be profitably devoted to it.

Another matter worthy of study by a taxonomist in this region is the occurrence of what appears to be a native race of Poa pratensis or else some very closely related species. A grass closely resembling Kentucky bluegrass but slightly different in type is found widely scattered over the Wasatch Plateau. It occurs in places where it is unreasonable to believe that it could be "tame" Kentucky bluegrass. The grass experts of the Department maintain that the commonly cultivated Kentucky bluegrass (Poa pratensis, as ordinarily received) of this country is not native but has been introduced from Europe; they are willing to concede, however, that certain obscure, apparently native specimens of Poa may prove to be races of Poa pratensis; the cultivated forms of Poa pratensis are, however, distinctly of an Old World type.

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DISTRICT 1

Mr. Charles Rouse, the temporary assistant, returned to the Montana Forest School, September 13. Arrangements were made for him to complete some of the compilations while at the University.

Mr. McGinnies left Missoula for Tucson, Arizona, on October 9. In Tucson, office space was secured in the Coronado Forest office where the heartiest cooperation has been extended in every possible way by the Forest force. The report on the Madison project was completed in preliminary form during November, but the manuscript needs a very thorough editing by the writer before it will be in shape to be submitted for criticism. It is planned to do this during the Christmas vacation at the University of Arizona.

Mr. McGinnies assumed his duties as Professor of Range Management and Range Grazing Specialist at the University of Arizona on December 1. This closes up the season's District 1 grazing research work.

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DISTRICT 3 - SEPTEMBER AND OCTOBER REPORTS

Early September was given over to a tentative survey of field conditions on the Coconino plateau of north central Arizona preparatory to a study of range use in the sawtimber type, and to some investigation of the relation of grazing intensity and management to timber production.

Messrs. Clapp, Chapline and Marsh spent some two weeks in the District in company with District Forester Pooler, confining the time largely to field observations in the localities in which research is centered. Copple and Cooperrider of the District research organization met the party at the Southwestern Forest Experiment Station from which place several day trips were made with Director Pearson observing yellow pine reproduction tendencies in enclosures fenced against all livestock as compared with conditions on overgrazed and heavily stocked range.

Summer precipitation on the Coconino plateau this year was almost nil and heavily stocked ranges are very short of feed. Areas lightly stocked in the past and at present still show the effect of good early spring precipitation.

Leaving the Experiment Station a trip was made to the Roosevelt Dam so routed as to pass through as good a representative section of each broad type in the pine belt on the plateau and the timber strip, chaparral, brush fields and semi-desert associations under the Mogollon Rim in the Tonto Basin. Primary consideration in observations and discussion was given to problems of timber production and grazing influences above and watershed protection and grazing influence below the Mogollon Rim.

The "Rim" as commonly called is an almost continuous, impassable cliff barrier varying from a few hundred to several thousand feet in height from its beginning, near the lower Grand Canyon in broken rim rock to become sharply defined as it extends across the State in a southeasterly direction, to where it loses its identity in the Mogollon Range in New Mexico. This massive topographic feature almost divides the State ecologically, topographically, climatically, industrially, and largely, as to exposed geological formation. In general, the adjacent region north of the "Rim" is plateau in character, that south badly broken and sculptured by influences of age-old erosion similar to those accounting for the Grand Canyon. The plateau region is conifer timbered shading into woodland at the lower elevations but forming practically one continuous belt of sawtimber from the Grand Canyon of the Colorado to the Rio Grande Valley. South of the "Rim" at a much lower elevation, with a topographic background weird in formation and gigantic in scale, lie the grass-woodland mesas, the live oak forests, chaparral-cypress slopes, brush fields, and semi-desert brush-cactus types above the desert valleys. Conifer timber is often a recurring type at higher elevations and sometimes as extensive bodies on the segregations once a part of the then much larger plateau. The Tonto Basin is an important watershed forest portion of this region draining into the Roosevelt reservoir, which in turn is the source of the water for irrigation in the Salt River Valley around Phoenix.

Three days were spent in the lower country looking over some of the field plots and considering plans for the grazing management project and in observing the watershed and grazing problems. The necessity for much more extensive work involving the erosion phases in the future were also considered as well as a cooperative program between the Southwestern Forest Experiment Station and Grazing Research on range management and grazing influence on timber production in the sawtimber type.

Leaving the Tonto Forest the party passed across the Globe division of the Crook Forest en route to the Santa Rita Range Reserve, visiting the Boyce-Thompson Arboretum at Superior where extensive work is being done with native as well as introduced plants.

Cooperrider made a trip with Dr. F. E. Clements of the Carnegie Institution of Washington and Dr. Walter Taylor of the Biological Survey through the pine, woodland and chaparral belts of Arizona and extended to include the Santa Rita Range Reserve. Dr. Clements was especially interested in the ecological conditions, though the trip was largely one for the consideration of the influences exerted by rodents on the range and watershed.

Rodents are an important factor in the region both from the standpoint of forage consumed, maintenance of valuable watershed cover and the revegetation or possibility of regeneration of depleted areas. The comparative results of volume production of vegetation and of natural revegetation between

grazed and protected areas have been found to be considerably influenced by rodent grazing. In some instances rodent pressure becomes so concentrated within the enclosure as to cause serious overgrazing of the most valuable forage species. Rabbits, both cotton tails and jacks, squirrels, wood rats, at least one species of kangaroo rat and mice are jointly or severally common to plot locations. It seems highly desirable that some research work be undertaken to determine the extent of rodent influence. The trip will doubtless result in some cooperative study of the problems.

Copple assisted by Dr. Taylor did the quadrat and vegetative work on the cooperative study of range damage by prairie dogs in northern Arizona. He was on annual leave during the latter part of September and in early October was on detail to the Kansas Agricultural College where he assisted Prof. A. E. Aldous in re-establishing the pasture experiments at the Kansas Station with which he was familiar while in college.

Copperrider spent a few days of early October in the District Office returning to winter headquarters at Roosevelt Lake on the ninth. He met Mr. Chapline in Phoenix October 12 to 16 to go over the research plans more thoroughly than was possible during the previous trip.

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DISTRICT 3 - NOVEMBER

The Grazing Research personnel attended the Tonto Forest's Ranger Meeting in the Supervisor's office in Phoenix on November 4 and 5. Copperrider gave a talk before the meeting on natural revegetation as a means of securing erosion control and proper range practices versus stock exclusion in securing adequate watershed protection. After the meeting Copple accompanied the Tonto Forest's field force on a three days examination of the Tom Caveness Range Allotment.

The Caveness Range is probably the best example of the local vegetative type in the general region as it was in the halcyon days of yearlong grazing. This range in manner of comparison typifies a condition that was very possible to secure and clearly indicates what could have been made of many other ranges now practically ~~xxixxx~~ depleted and ruined that were of potentially the same value less than twenty years ago.

The general range type on the Caveness Allotment is upper semi-desert; curly mesquite (Hilaria cenchroides) and grama (Boutelcua sp.) grasses, mesquite (Prosopis), dwarf mesquite (Calliandra humilis), cat's-claw (Mimosa sp.), coffee-berry (Simmondsia) association. The range has been vegetatively improved through the years until it supports more stock than at the time of fencing while almost all ranges in the type have deteriorated. During the past several years while very unfavorable forage production has been secured maximum sales price has been obtained without

cut-back of inferior stock. The average surface acre stocking on this breeding range is now eighteen acres per head yearlong. Regardless of the finer features of breeding and production that may influence the economic success of the undertaking this operation represents an example of highest importance to forest administration; first in that a selection of vegetative combinations susceptible to a given use was secured, in other words a real range unit; second a stocking policy was followed which had for its goal improvement and finally utilization on a basis of sustained yield of vegetation. Such a policy gave a combination of these much sought for conditions; a ground work on which it is possible to apply the finest of grazing management, a highly satisfied permittee, an economic operation, sustained production for the forest area, and satisfactory forest condition.

The month has been devoted largely to field work in connection with the browse range project on the Salt River watershed. Quadrating, vegetation production data listing, browse measurements, utilization determinations have followed early and late. Instead of the field season coming to a close with this season of the year this project gets into full swing.

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